

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claims 1-50. (Cancelled)

51. (new) A molecular single electron transistor (MSET) detector device comprising at least one organic molecule attached to a drain electrode and a source electrode wherein, in use, said at least one organic molecule provides a quantum confinement region characterised in that at least one analyte receptor site is provided in the vicinity of said at least one organic molecule.

52. (new) A device according to claim 51 wherein the at least one organic molecule provides at least one analyte receptor site.

53. (new) A device according to claim 51 wherein at least one analyte receptor site is located adjacent, but is not attached to, said at least one organic molecule.

54. (new) A device according to claim 51 wherein said at least one organic molecule is an elongated conjugated organic molecule having first and second ends, the first end being attached to the source electrode and the second end being attached to the drain electrode.

55. (new) A device according to claim 51 wherein a single organic molecule is attached to the source electrode and the drain electrode.

56. (new) A device according to claim 51 wherein said at least one organic molecule is attached to the source and drain electrodes via tunnel barriers.

57. (new) A device according to claim 56 wherein the tunnel barriers are provided by electrically insulating regions of said at least one organic molecule.

58. (new) A device according to claim 56 wherein the source and drain electrodes each comprise an insulating material that forms said tunnel barriers.

59. (new) A device according to claim 51 in which a first layer of material provides the source electrode and a second layer of material provides the drain electrode wherein said first and second layers sandwich, and are spaced apart by, a third layer of substantially insulating material.

60. (new) A device according to claim 59 and further comprising a gate electrode.

61. (new) A device according to claim 59 wherein a recess is provided in the third layer of substantially insulating material to provide a region between the source and drain electrodes in which the at least one organic molecule is located.

62. (new) A device according to claim 59 wherein the thickness of the third layer of substantially insulating material is substantially equal to the length of the at least one organic molecule.

63. (new) A device according to claim 59 wherein at least one of the first and second layers of material comprise semiconductor material.

64. (new) A device according to claim 63 wherein the semiconductor material comprises silicon.

65. (new) A device according to claim 64 wherein the at least one organic molecule comprises end chains that will bind to silicon.

66. (new) A device according to claim 60 wherein the first layer of material comprises a silicon wafer, the second layer of material comprises polysilicon and the third layer of substantially insulating material comprises a silicon oxide.

67. (new) A device according to claim 66 wherein the wafer additionally carries a layer of polysilicon to form the gate electrode, the fourth layer being separated from the silicon wafer by a layer of silicon oxide.

68. (new) A device according to claim 66 that is formed using a process that comprises a complementary metal oxide semiconductor (CMOS) fabrication process.

69. (new) A device according to claim 51 and further comprising means for measuring the conductivity of the at least one organic molecule as a function of applied source-drain voltage.

70. (new) A device according to claim 70 and further comprising means for measuring the conductivity of the at least one organic molecule as a function of applied gate voltage.

71. (new) A device according to claim 59 and further comprising integral electronic circuitry for measuring the conductivity of the at least one organic molecule.

72. (new) A fluid analyser comprising an MSET device according to claim 51.

73. (new) An analyser according to claim 72 and further comprising a pre-concentrator for releaseably retaining analytes from a fluid.

74. (new) An analyser according to claim 73 wherein the pre-concentrator comprises a layer of material having a plurality of apertures through which a fluid can be passed, the internal surfaces of said apertures being adapted to releaseably retain analytes from the fluid.

75. (new) An analyser according to claim 74 wherein the internal surfaces defining said plurality of apertures of the pre-concentrator are porosified.

76. (new) An analyser according to claim 74 wherein the layer of material from which the pre-concentrator is formed comprises a layer of silicon, said apertures being formed through said layer of silicon and arranged to form a honeycomb structure.

77. (new) An analyser according to claim 74 wherein the internal surfaces of the apertures of the pre-concentrator are reversibly adsorptive.

78. (new) An analyser according to claim 73 wherein the pre-concentrator comprises a heater.

79. (new) An analyser according to claim 73 and further comprising a fluid gating structure for controlling the flow of fluid from the pre-concentrator to the MSET device.

80. (new) An analyser according to claim 73 wherein the fluid gating structure is arranged to selectively route fluid from the pre-concentrator to either one of the MSET device and an exhaust port.

81. (new) An analyser according to claim 73 wherein the fluid gating structure comprises a substantially planar substrate and a shutter that is moveable in the plane of said substrate.

82. (new) An analyser according to claim 73 wherein fluid is routed from the fluid gating structure to the MSET device along a channel having a long axis that is substantially perpendicular to the plane of the substantially planar substrate of the fluid gating structure.

83. (new) An analyser according to claim 73 wherein the fluid gating structure comprises a shutter that is shaped such that it can engage and seal the entrance to said channel.

84. (new) An analyser according to claim 73 wherein the shutter may be retained, without the application of power, in an open position in which fluid is routed from the pre-concentrator to the MSET device or in a closed position in which fluid is routed from the pre-concentrator to an exhaust port.

85. (new) An analyser according to claim 73 wherein the shutter is a micro-electromechanical (MEMS) shutter.

86. (new) An analyser according to claim 85 wherein the fluid gating structure comprises a MEMS electro-thermal actuation mechanism to impart movement to the MEMS shutter.

87. (new) An analyser according to claim 86 wherein the fluid gating structure further comprises a MEMS compliant displacement mechanism.

88. (new) An analyser according to claim 79 wherein the pre-concentrator, fluid gating device and MSET device are formed as substantially planar layers and are arranged in a stack.

89. (new) An analyser according to claim 88 wherein each substantially planar layer comprises silicon.

90. (new) An analyser according to claim 72 and further comprising a fluid pump.

91. (new) An analyser according to claim 72 and further comprising an integral power source.

92. (new) A method of chemical detection comprising the steps of; (a) taking a molecular single electron transistor comprising at least one organic molecule attached to a drain electrode and a source electrode wherein, in use, said at least one organic molecule provides a quantum confinement region and (b) providing at least one analyte receptor site in the vicinity of said at least one organic molecule for receiving analytes.

93. (new) A method of chemical detection according to claim 92 and further comprising the step of (c) measuring the electrical characteristics of said molecular single electron transistor to determine the presence or otherwise of an analyte.

94. (new) A method of chemical detection according to claim 92 and further comprising the step of passing a fluid over the at least one analyte receptor site.

95. (new) A molecular single electron transistor (MSET) detector device comprising at least one organic molecule attached to a drain electrode and a source electrode wherein, in use, said at least one organic molecule provides a quantum confinement region characterised in that at least one of said source electrode and said drain electrode are formed from semiconductor material.

96. (new) A method of forming a molecular single electron transistor comprising the steps of (i) forming source and drain electrodes and (ii) locating an organic molecule

between said source and drain electrodes, characterised in that the source and drain electrodes are formed using a complementary metal oxide (CMOS) process.